

NOTES ON CONVERSATIONS WITH DR. EDUARDO RAMOS,
DR. EMILIO IPANZO AND MR. FRANCISCO PASCUAL OF THE SPANISH
JUNTA ENERGIA NUCLEAR, MADRID - SEPTEMBER 18-21, 1974

STATUS OF THE INDALO PROJECT AT PALOMARES

I Introduction

The code name Indalo was used when it was desirable to avoid the name "Palomares." Few people now recognize Palomares, much less what happened there on January 17, 1966. "Indalo" is the ancient Iberian name for the stick figures found in Cro-Magnon caves behind the playa on which Palomares is located.

The project was designed to: 1) maintain surveillance on the 68-72 people presumably most exposed to Pu from the one-point explosions of two of the four large weapons; 2) monitor levels of Pu in the ambient air; 3) monitor vegetables and crops and vegetation-contamination for Pu; 4) maintain surveillance on the movement of Pu in the soils of four areas in Palomares; 5) repeat on suitable controls. This is the essence of the Hall-Otero agreement, developed after the military had completed their cleanup and restoration.

The AEC via LASL has provided analytical equipment, lung counters, a whole body counter and related electronics for surveillance, while DBER has transferred \$25,000 annually via the Embassy in Madrid to pay technicians, buy chemicals and things, transport the people to Madrid for examination, and operate a resident office at Palomares to collect the samples. The Spanish provide first rate laboratory space, examining rooms, professional directorships and maybe half the total expenses. They have the right to report whatever they find about Palomares and are willing to put their names to. I believe they have proven more conservative about publication than we would have been.

II. General information having to do with changes in mission of the Junta since 1972.

It appears that under the Premiership of Mr. Carrero-Blanco there was a determined effort to grow and expand in nearly all national aspects, and never mind the degree of inflation. The Ministry of Industria, under Jose Maria LOPEZ DE LETONA, charged with this task appears to have put the machinery into high gear. Currently, 22 months later, major building and

improvements of all sorts are going on everywhere -- hydro-electric and water supply dams, roads, housing, agriculture, heavy industry, etc., etc.; to me it resembles the Japanese inflationary push that has gotten out of hand. Most of this seems to be on money borrowed internally. A good bit is speculative with the Franco Government sharing to the tune of maybe 40 to 60% of the principal via low cost loans. One of my conservative friends fears an explosive disintegration of this interlocking expansion, particularly at a time when the government may be changing hands with all the uncertainties that means in Spain. Carrero-Blanco's assassination may have been providential in that the drive for expansion may now be tempered by normal Spanish caution.

A key part of this program was and is the provision of ample electrical power. The rail lines are being electrified, the steel mills are to be more completely electrified, power lines are going into each village and so on. Spain has no oil, little coal and they long ago made semi-deserts of their woodlands. This accounts for the eight or nine reactors intended for 1980 and the 12 to 15 more by mid 1985-1990. They are justly nervous about an assured supply of enriched uranium since they have found only a few low-grade sources in Spain.

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Ownership of the reactors is to be vested in various private power companies, but the government has a large stake in each of them -- I was not able to determine the relation by which the government, as both broker and giver of franchises, interacts with these private companies. This governmental participation has a special connotation in that the Minister of Industria and his friends can play both ends against the middle. This apparently is what he did via judicious use of two trusted lieutenants. The Minister, Jose Maria LOPEZ DE LET with two lieutenants ("confidantes") formed a kind of triumvirate that could have given him a strong position in industry and hence become a major figure in government. One lieutenant seems to have been a sort of roving-ambassador organizing the power companies into a cartel dependent on the Ministry. The other was appointed General Secretary to the Junta in place of Mr. Pascual under Professor Otero, then President of the Junta.

It was not long before the new man (Francisco PEREZ Cerda, I believe but am not certain) was acting as Vice President and in general taking over as Professor Otero became

more and more incapacitated. Professor Otero should have long since resigned perhaps but he was not asked to do so because he has friends in very high places and it was a matter of honor. Professor Otero, from the late 1950s, had demanded a high quality of scientific research and development from the Junta. He aimed at building a staff competent in all phases of nuclear energy in anticipation of the advent of reactors. Training Spanish technicians and R&D scientists was also emphasized. The staff of the Junta was able to carry out in the laboratory the full fuel recycling, from mining through reprocessing fuel elements removed from a reactor which they themselves for the most part built.

The lieutenant's appointment was associated with resignations in the top managerial levels including Mr. Pascual's. He promptly began to make changes in the Junta's mission and organization which amounted to a reorganization. Some of the Division level heads were neutralized or left of their own accord and so the Junta before long became a kind of handmaiden to the power companies and the Minister of Industria's plans. Whether these changes are good or bad, useful or destructive, I'm not able to say, but morale quickly went down. It sounded to me as if he had forcibly remade the Junta into a licensing and regulatory outfit primarily with the analytical, technical, and scientific expertise within the Junta to be used on call. The staff of the Junta did not want to change, to travel, to be un-scientists, to take responsibility for making decisions subject to challenge. Most of all they didn't like being pawns.

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When Carrero-Blanco was assassinated in December 1973, General Franco appears to have taken a more direct role in the government. Finally the present appointments to the Junta (September 1974) were made public: Lt. General Jesus Olivares Broque, the army's top electronics and communications officer for Professor Otero by reason of illness. (The Broque is rarely used. It is the mother's family name. It is evenly accented - Bro-kay.) Mr. Francisco Pascual was brought back as Director General to become the equivalent of managing director. The staff know, respect, and like him but have no idea of the conditions -- on both sides -- under which he came back.

I had a 15-minute interview with him on Thursday, September 19. He said he had a long task ahead trying to catch up. He seemed to be the same person I had known before but he was duded up in a mod haircut, big-lens glasses and a sharp suit. I was a bit surprised when he said that Abe Friedman had spent the weekend with him -- they appear personal friends who visit in each other's homes. This explains why Abe did not appear in Vienna until Tuesday a.m. Pascual was puzzled by my saying that I had not seen General Olivares at the IAEA Conference although I had made a point of keeping the Spanish desk in sight. I should have looked for a florid, short, plumpish, 63 or so year old man with a lot of bounce. The instructions to the General by the new Ministry of Industria are not known at the Junta staff level.

Mr. Pascual did say flatly, after the recommendation of Drs. Iranzo and Ramos, that the Junta wished to continue the program at Palomares. He also was pleased when I transmitted your message about fuel supplies. He asked about Pu-recycle; I said it might be a year before we shall have moved through the NEPA sequence and could speak definitely. He indicated that he understood the problem and then made a joking remark to the effect that it was a bad day when the U.S. had "invented intervenors." Ramos later confirmed what I had seen in "Energy Report" that the Spanish people were taking to intervenor-ship with a vengeance, suggesting perhaps that it might be a kind of outlet.

On the whole, Mr. Pascual is very much the same man I had known before, but now is mature, assured and very much the executive. Indicative of the former status of the staff at the line Director level is Iranzo's promise to send me a schema of organization with titles as soon as it is published.

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Both Iranzo and Ramos expect the former operational trend to be reversed under Olivares-Pascual, but I wouldn't want to bet on it. Someone heading some group will have to carry out the licensing and regulation and will have to organize formally for this purpose. I can imagine Mr. Pascual being the person who will do this and it may well be that the Junta's days of the fun of discovery by doing are over. Keeping tabs on 20 or so reactors for the government would be a full-time job for the Junta's staff even if enlarged and supplemented in certain capabilities.

The Junta seems to be using our Regulatory rules and procedures, as well as our techniques and standards; the Junta must buy several copies of everything the AEC puts out dealing with licensing and operations. Intervenor activity is just getting a foothold in Spain and it is clear that the government doesn't know how to cope except in an authoritative way. It sounds as if the power companies and government listen, and unless strong influence is brought to bear, proceed with the decisions to site, construct and operate.

Dr. Ramos may retire from the Junta but retain his rather high echelon post in Naval medicine. In that case, Dr. Iranzo would become the person responsible for the Proyecto but he is a Ph.D. in engineering, not an M.D. There is no question of his interest and ability but an M.D. is essential. When Dr. Ramos visits Palomares he has to hold an outpatient clinic, drink the local wine (not very good), get caught up on the local problems. In this role he is invaluable, not to mention his ability to arrange contacts with the medical profession in Madrid, Barcelona or Alicante in behalf of people with medical problems. Thus, it would seem advisable to find a way of retaining Dr. Ramos' services on the project.

III. Observations to present on Palomares

The area is highly mineralized with ancient Phoenician lead, silver, and iron mines. The background from the uranium-radium series is high and all analyses have to be specially treated to isolate the Pu for specific pulse height determination. The chemistry is difficult and the counting time for each sample is a minimum of 1000 minutes.

From July 1966 through 1968 the Pu in the ambient air samples was 0.1 to 100 times background both local and worldwide, but still was in the range of 10^{-15} curies per meter³. The pattern of levels on the filters indicated that the contamination was individually particulate -- a single particle on a filter might give a count rate much higher than the usual level.

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The soil samples were taken on a random square basis and at specific depths from dedicated sites. The distribution is clearly particulate and unpredictable: Horizontal and vertical 10x10x10 cm soil samples may differ by more than 1000 disintegrations per minute. Add to this the fact that aliquots of the same sample may vary by factors of 10^3 and the perturbations from the deep plowing and re-contouring that was done. All in all, trying to make sense of the movement of Pu in the soil is going to be very difficult,

if not impossible. Possibly it is not worth the effort, time, and money that will have to be put into it. Possibly it would be better to document the levels of Pu in the surface soils of a larger number of places.

The vegetation was mainly surface contaminated and here too irregularly found from sample to sample. Simple washing removed most activity on items like tomatoes but not in the case of coarse grasses such as asparto and "stink weed" and prickly pear cactus; the latter seems to be able to incorporate or hold Pu better than any other vegetation. These plants by way of their detritus may be a source of renewed surface contamination, but the special controlled study needed to decide this question has not been done -- the project is more one of surveillance than ecological investigation.

Since some of the food animals (pigs, goats, and chickens) may pick up surface contamination from various sources and pass it on to the people, Dr. Ramos plans to buy chickens and samples of pig and goat meat to examine this possibility. The probability of this route being significant is low due to low solubility and dilution of the PuO₂.

Sixty-nine of the inhabitants most likely to have pulmonary retention by reason of being downwind from the bursts were checked out first by urine sampling and later by chest counting. The urine samples taken on site and supposedly 24-hour "clean" collections were hopeless -- they varied irregularly in the same subject from zero to improbable peaks. Their habits were not suited to this method. Later, when brought to Madrid and prepared for chest counting, the urines were "trace" or zero and the chest counts were below detectable, 40 nCi, essentially the maximum permissible lung burden. The chest detector was subsequently modified to give a limit of detection of 16 nCi; the new equipment provided in 1973 will allow detection of 7-8 nCi.

Dr. Ramos proposes to recount these people plus any others, e.g., three policemen who helped cordon off the area in 1966, who wish to be checked out.

IV. Effects on agriculture and the people

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The monitoring carried out has relieved fears that their tomato crops would be unsaleable. The drought of 1969-73 hit them very hard and obscured whatever else might have

been said or been the basis of discontent. Now with ample fresh water the land is productive and the market for Costa Brava tomatoes is tops.

There have been no unusual illnesses except for two cases of leukemia in young people. The drought forced many to seek jobs outside, especially in Barcelona. One of those who emigrated to Barcelona (I believe in 1969) was a 20-year old boy who was found to have acute leukemia by a Barcelona physician in July 1972. He died last year without autopsy. He was one of those counted and found to have no detectable burden. Causality therefore is questionable. Now a second person, a 22-year old mother, has been diagnosed in Barcelona to have leukemia, but her family refuses absolutely to discuss the matter or have treatment or permit Dr. Ramos to contact the Barcelona physician.

Dr. Ramos' procedure in these cases is to see that the people have access to the best specialists with the people making the choices. He then stays out of the matter entirely -- the attending physician has given Dr. Ramos a summary now and then. The Spanish Health System pays the bills for the most part. Some of our funds probably go to supplementing the standard professional fees as the services of these "name" physicians come higher. I would judge that there have not been more than three or four such cases where this special consultation was obtained. (I did not go into this because it might have seemed to be asking for an accounting.)

I have a strong impression that the Spanish might have been content to follow the Indalo project for a decade and then quietly drop it. The upper echelons are not very enthusiastic about Ramos and Iranzo publishing their data. These two cases, however, while they can't be demonstrated to be causally related to having lived on the contaminated area, raise questions that can't be dismissed: Two cases of leukemia in 20-22 year olds in 1500 to 2000 people have to be given consideration although it may occur probabilistically.

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So it looks as if we should be prepared to continue the Hall-Otero agreement for another five years while urging them to analyze the loads of samples stored in cartons and jars. This is an actual, natural experiment: Here are people living on a Pu-contaminated area that has been decontaminated as thoroughly as possible. The residual Pu is distributed in small particles more or less randomly in and on the earth. Drinking contaminated water does not

enter the equation. Contaminated food probably is an unimportant source. Therefore, there are three sources of Pu contamination to be considered:

- 1) Hand to mouth to gut from the accident;
- 2) Earth-dust to respiratory system with part to gut and part to lung, the latter in part being transferred by blood to the endosteal surfaces and liver from the accident;
- 3) General intake from fallout of weapon testing. Prime routes inhalation and gut. This source has now declined to a low level and is more or less stabilized.

The project is hampered by lack of good vital statistics and adequate controls. But considering the cost in money and time for specific Pu-239 assays, we are getting a large return for our investment. We were fortunate that the Spanish have taken this "insult" to their territory and people in such a matter-of-fact way.

V. Meeting with Mr. Ferguson, Cultural Attache, American Embassy, Madrid, September 20, 1974, 1815 to 2030.

Mr. Ferguson noted with pleasure that his title had just changed to First Secretary and thus he had more than just curiosity in asking about Palomares. The two plus hours passed very pleasantly, the talk ranging from basic mechanisms of energy transfer to probable effects of impending changes in the Spanish government. **DOE ARCHIVES**

The Embassy is somewhat under staffed and most men and women have to serve in more than one capacity. This accounts for much of the seeming neglect of the Junta by the Embassy. He said that he had visited the Junta only twice but had been received graciously. He was aware of the drive for nuclear power but as it was a commercial affair it was in a colleague's hands. As First Secretary, however, it would be his duty to see that the new Ambassador, Mr. Flanigan presumably, was fully briefed on the contribution of the AEC, including the fuel question, to Spain's well-being. After the proper number of circumlocutions, I allowed that the Commission or appropriate Staff would be willing to brief Mr. Flanigan fully on the

technologies, the problems to be dealt with, the size of the investments, and the international implications. He seemed relieved for he promised to pass my offer along to State.

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